Fig.1

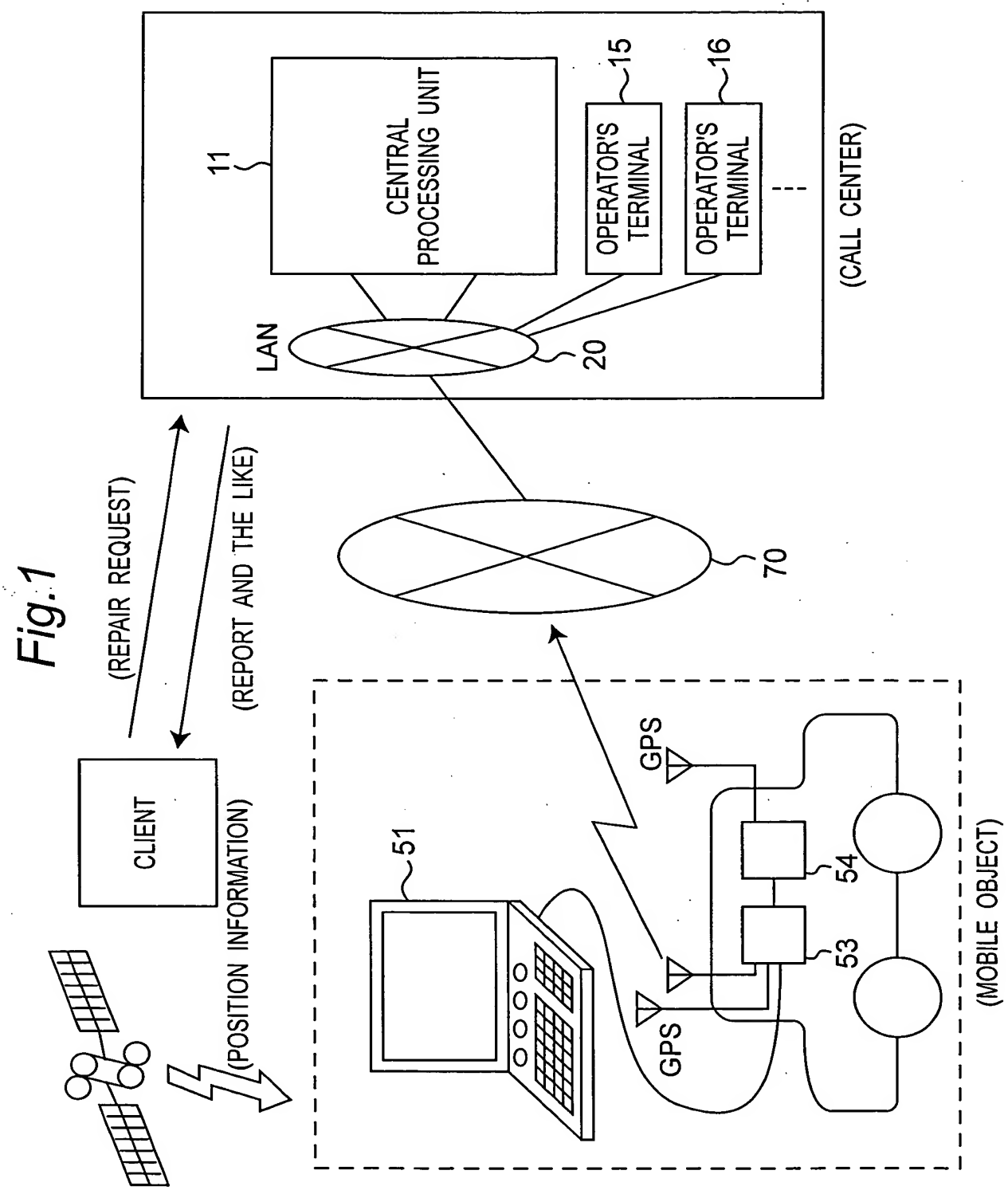

(CALL CENTER)
11
CENTRAL PROCESSING UNIT
15
OPERATOR'S TERMINAL
16
OPERATOR'S TERMINAL
LAN
20
70
(REPAIR REQUEST)
(REPORT AND THE LIKE)
CLIENT
(POSITION INFORMATION)
GPS
GPS
51
53
54
(MOBILE OBJECT)

Fig.2

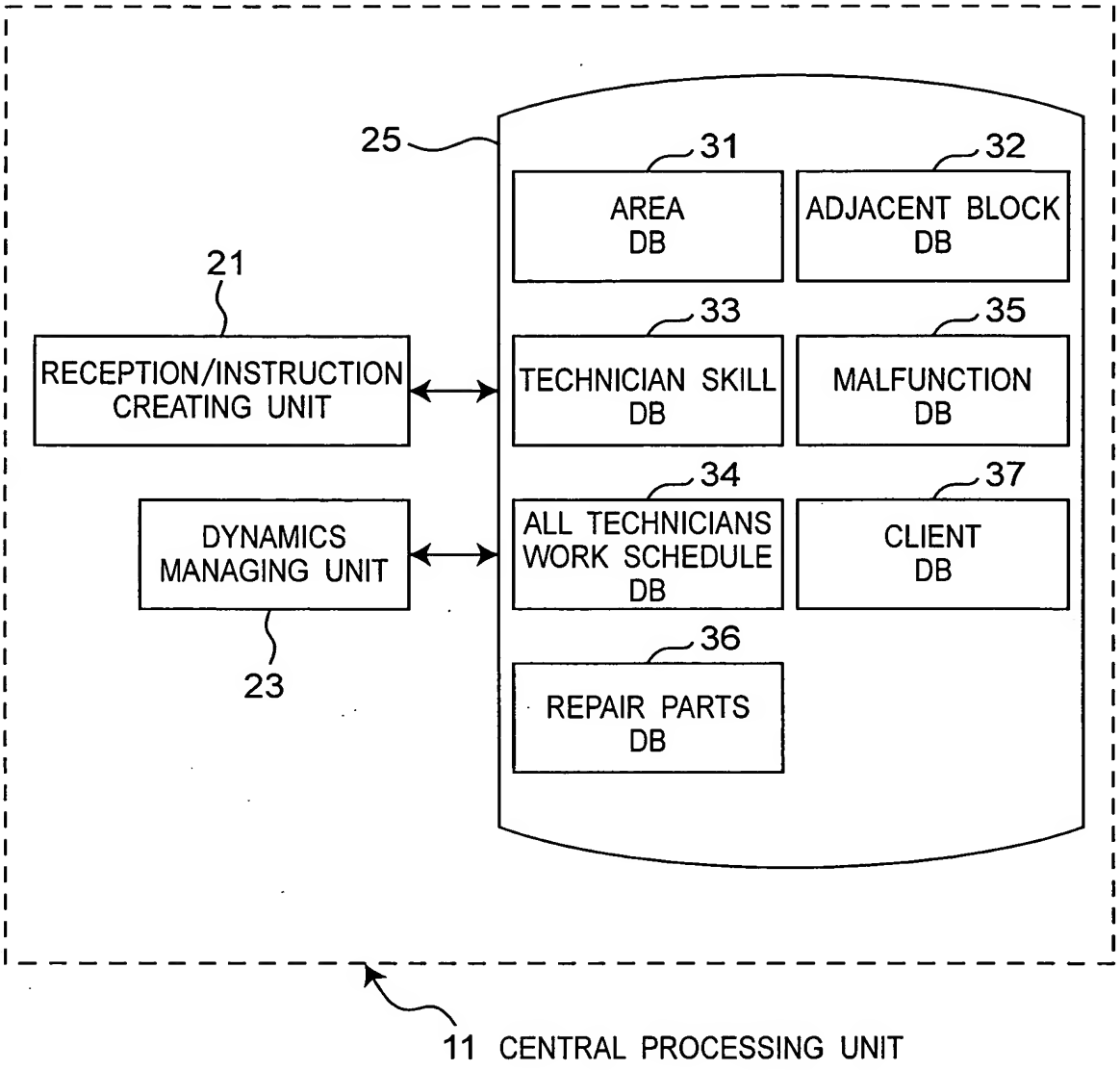

25
31
AREA DB
32
ADJACENT BLOCK DB
21
RECEPTION/INSTRUCTION CREATING UNIT
33
TECHNICIAN SKILL DB
35
MALFUNCTION DB
34
ALL TECHNICIANS WORK SCHEDULE DB
37
CLIENT DB
DYNAMICS MANAGING UNIT
23
36
REPAIR PARTS DB
11 CENTRAL PROCESSING UNIT

Fig.3

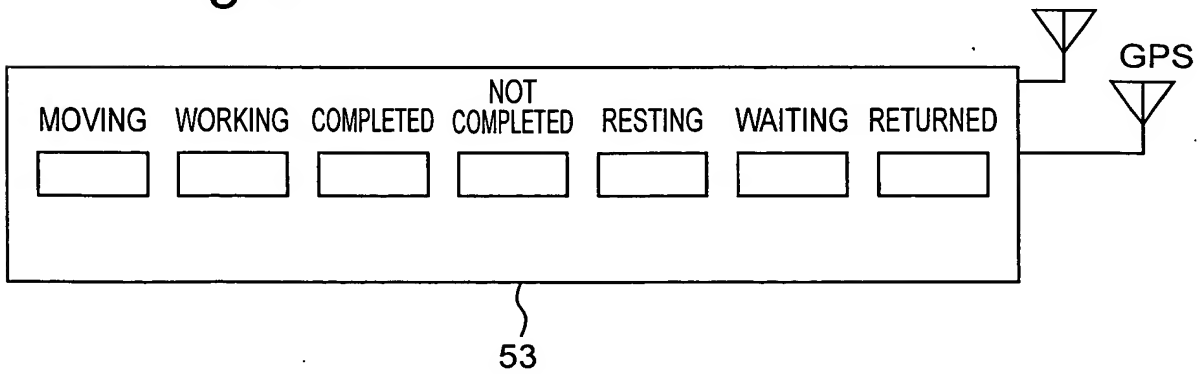

GPS
MOVING
WORKING
COMPLETED
NOT COMPLETED
RESTING
WAITING
RETURNED
53

Fig.4A

AREA DATABASE

ZIP CODE	BLOCK	WORKER IN CHARGE					
		OCTOBER 1	OCTOBER 2	OCTOBER 3	···	OCTOBER 30	···
123-4567	A1	5001(YAMADA) 5002(SUZUKI) 5003(YAMAMOTO)	5001(YAMADA) 5111(SATO) 5003(YAMAMOTO)	5001(YAMADA) 5002(SUZUKI) 5003(YAMAMOTO)	··· ··· ···	5001(YAMADA) 5111(SATO) 5003(YAMAMOTO)	··· ··· ···
123-4568	A2	5125(UEDA)	5125(UEDA)	5125(UEDA)	···	5125(UEDA)	···

Fig.4B

ADJACENT BLOCK DATABASE

ZIP CODE	BLOCK	SERVICE BASE POINT	ADJACENT BLOCK		
			BLOCK 1	BLOCK 2	BLOCK 3
123-4567	A1	123	A2	A3	B1
123-4568	A2	456	A1	B2	B3

Fig.4C

TECHNICIAN SKILL DATABASE

TECHNICIAN CODE	WORKER IN CHARGE	CATEGORY	PRODUCT SECTION	PRODUCT NAME	SKILL EVALUATION		
					EXCELLENT	PROPER	IMPROPER
5001	YAMADA	WIRELESS	01	TELEVISION	◎		
		WIRELESS	02	VIDEO SYSTEM	◎		
		WIRELESS	03	HI-VISION	◎		
		ELECTRIFICATION	04	REFRIGERATOR		○	
		ELECTRIFICATION	05	WASHING MACHINE			×

Fig.5A ALL TECHNICIANS WORK DATABASE

TECHNICIAN CODE	TECHNICIAN	AFFILIATION	SECTION	OCTOBER 1				OCTOBER 2			···
				AM	PM	UNDECIDED	TOTAL	AM	PM	UNDECIDED	···
5001	YAMADA	123	PLAN SCHEDULE RECORD	3 2	7 5		10 7				···
5002	SUZUKI	123	PLAN SCHEDULE RECORD	2 2	8 8		10 10				···

Fig.5B MALFUNCTION DATABASE

PRODUCT	CONDITION CODE	CONDITION OF MALFUNCTION	SKILL
TELEVISION	000	REMOTE NOT WORKED	○
	001	REMOTE NOT SENSED	○
	011	POWER NOT TURNED ON	◎
	029	HI-VISION NOT RECEIVED	◎

Fig.5C REPAIR PARTS DATABASE

PRODUCT	MODEL	CONDITION CODE	PART CODE NUMBER	REPAIR COMPLETION PROBABILITY (%)
TELEVISION	A	001	ABCD	40
	A	002	EFGH	18
	B	001	JKLM	25

Fig.5D CLIENT DATABASE

ZIP CODE	NAME	ADDRESS	TELEPHONE	POSITION INFORMATION	PRODUCT 1	PRODUCT 2	PRODUCT 3	···
123-4567	ABCD	KITA-KU OSAKA CITY···	xx-xxx1	(x1, y1)	aaa	bbb	ccc	···
234-5678	vxyz	CHUO-KU OSAKA CITY···	xx-xxx2	(x2, y2)	bbb			···

Fig.6

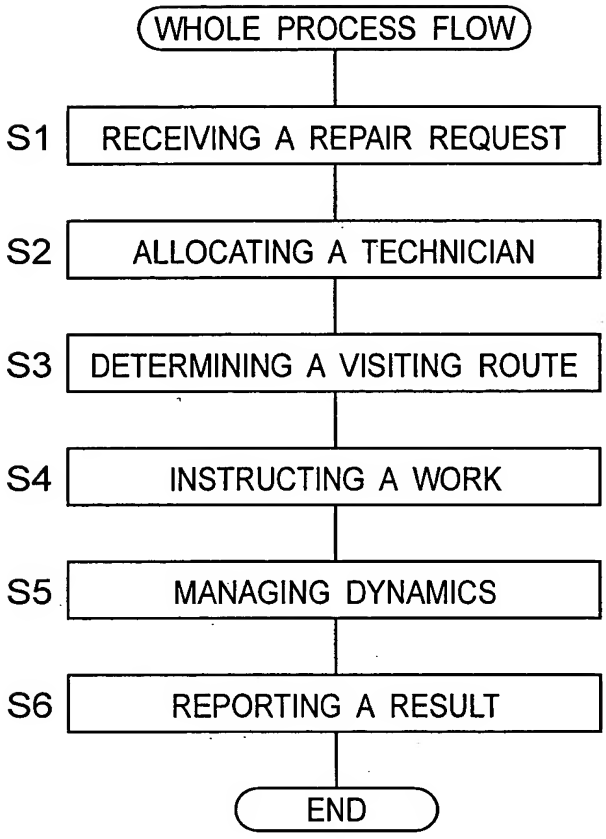

WHOLE PROCESS FLOW
S1
RECEIVING A REPAIR REQUEST
S2
ALLOCATING A TECHNICIAN
S3
DETERMINING A VISITING ROUTE
S4
INSTRUCTING A WORK
S5
MANAGING DYNAMICS
S6
REPORTING A RESULT
END

Fig.7

INPUTTED CLIENT INFORMATION

ZIP CODE	REPAIR PART	NAME	ADDRESS	TELEPHONE	MALFUNCTION CONDITION	ERROR STATUS	DESIRED DATE	···
123-4567	ABCD	abc	KITA-KU OSAKA CITY···	xx-xxx1	0001	S1001	2003/10/30	···
234-5678	vxyz	pqr	CHUO-KU OSAKA CITY···	xx-xxx2	0201	A001	2003/10/30	···

Fig.8

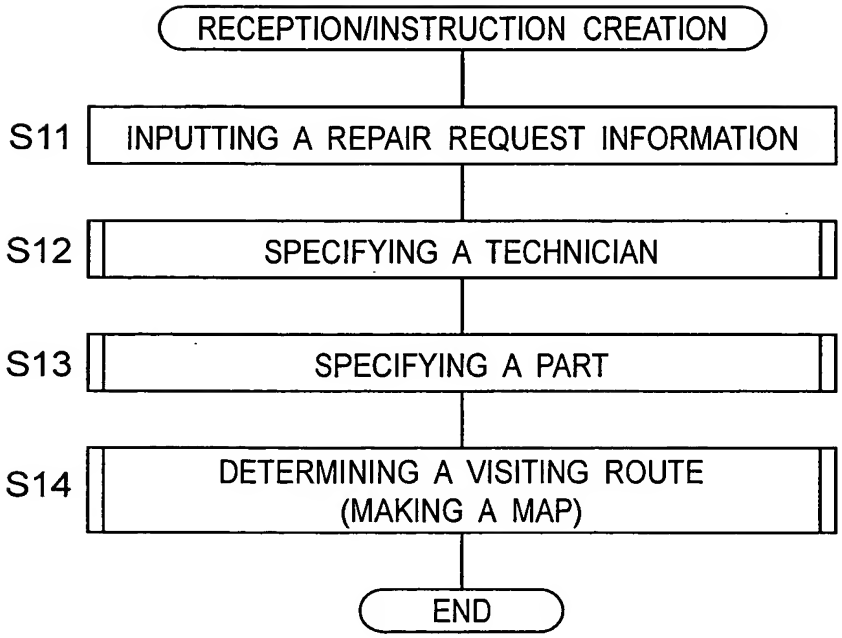

RECEPTION/INSTRUCTION CREATION
S11
INPUTTING A REPAIR REQUEST INFORMATION
S12
SPECIFYING A TECHNICIAN
S13
SPECIFYING A PART
S14
DETERMINING A VISITING ROUTE
(MAKING A MAP)
END

Fig.9

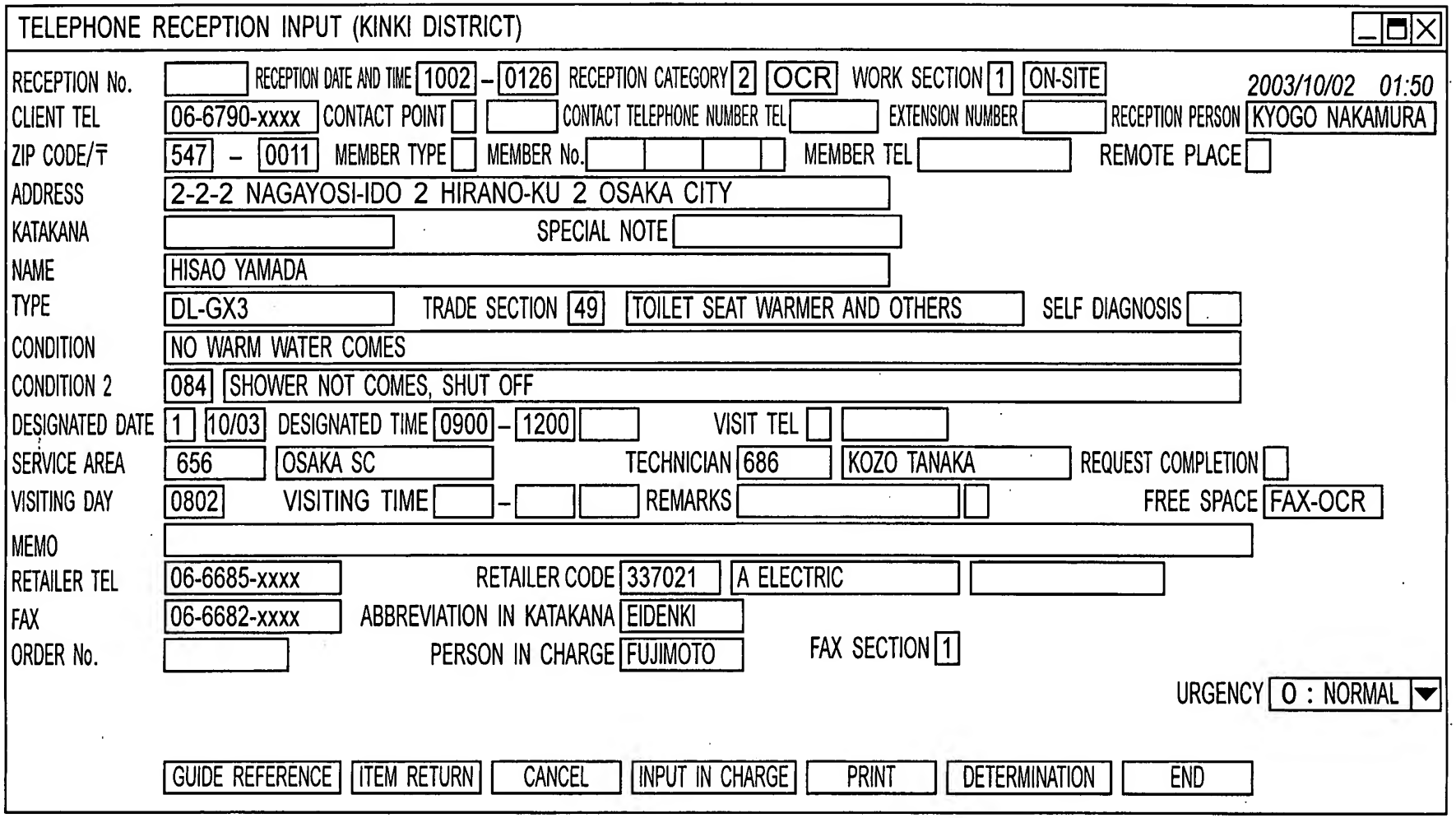

TELEPHONE RECEPTION INPUT (KINKI DISTRICT)
RECEPTION No.
RECEPTION DATE AND TIME 1002 – 0126
RECEPTION CATEGORY 2 OCR
WORK SECTION 1 ON-SITE
2003/10/02 01:50
CLIENT TEL 06-6790-xxxx
CONTACT POINT
CONTACT TELEPHONE NUMBER TEL
EXTENSION NUMBER
RECEPTION PERSON KYOGO NAKAMURA
ZIP CODE/〒 547 – 0011
MEMBER TYPE
MEMBER No.
MEMBER TEL
REMOTE PLACE
ADDRESS 2-2-2 NAGAYOSI-IDO 2 HIRANO-KU 2 OSAKA CITY
KATAKANA
SPECIAL NOTE
NAME HISAO YAMADA
TYPE DL-GX3
TRADE SECTION 49 TOILET SEAT WARMER AND OTHERS
SELF DIAGNOSIS
CONDITION NO WARM WATER COMES
CONDITION 2 084 SHOWER NOT COMES, SHUT OFF
DESIGNATED DATE 1 10/03
DESIGNATED TIME 0900 – 1200
VISIT TEL
SERVICE AREA 656 OSAKA SC
TECHNICIAN 686 KOZO TANAKA
REQUEST COMPLETION
VISITING DAY 0802
VISITING TIME –
REMARKS
FREE SPACE FAX-OCR
MEMO
RETAILER TEL 06-6685-xxxx
RETAILER CODE 337021 A ELECTRIC
FAX 06-6682-xxxx
ABBREVIATION IN KATAKANA EIDENKI
ORDER No.
PERSON IN CHARGE FUJIMOTO
FAX SECTION 1
URGENCY 0 : NORMAL
GUIDE REFERENCE
ITEM RETURN
CANCEL
INPUT IN CHARGE
PRINT
DETERMINATION
END

Fig.10

REPAIR INFORMATION

CREATED DATE	20031023
WORKER IN CHARGE CODE	12345678
WORKER IN CHARGE NAME	MATUSITA
RECEIVED DATE	20031023
RECEIVED TIME	1030
RECEPTION NUMBER	1234567890
MODEL	AB-1234R
CONDITION	MALFUNCTIONING
SERVICE REQUEST	CALL IN THE MORNING
CLIENT TELEPHONE NUMBER	06-1234-5678
CLIENT CONTACT TELEPHONE NUMBER	06-5678-1234
CLIENT CONTACT EXTENSION NUMBER	1234
CLIENT ADDRESS	XX-KU OSAKA CITY
CLIENT ZIP CODE	123-4567
CLIENT NAME	SABURO TANAKA
DESIGNATED VISIT DATE	20031024
DESIGNATED VISIT TIME	1000
RETAILER TELEPHONE NUMBER	06-XXXX-XXXX
RETAILER NAME	ABC ELECTRONIC
RETAILER FAX NUMBER	06-XXXX-XXXX
RETAILER'S PERSON IN CHARGE	UEDA

POSITION INFORMATION (LATITUDE)	N xx° yy' zz"
POSITION INFORMATION (LONGITUDE)	E aa° bb' cc"
PART 1	a123
PART 2	a444
PART 3	c677

Fig.11

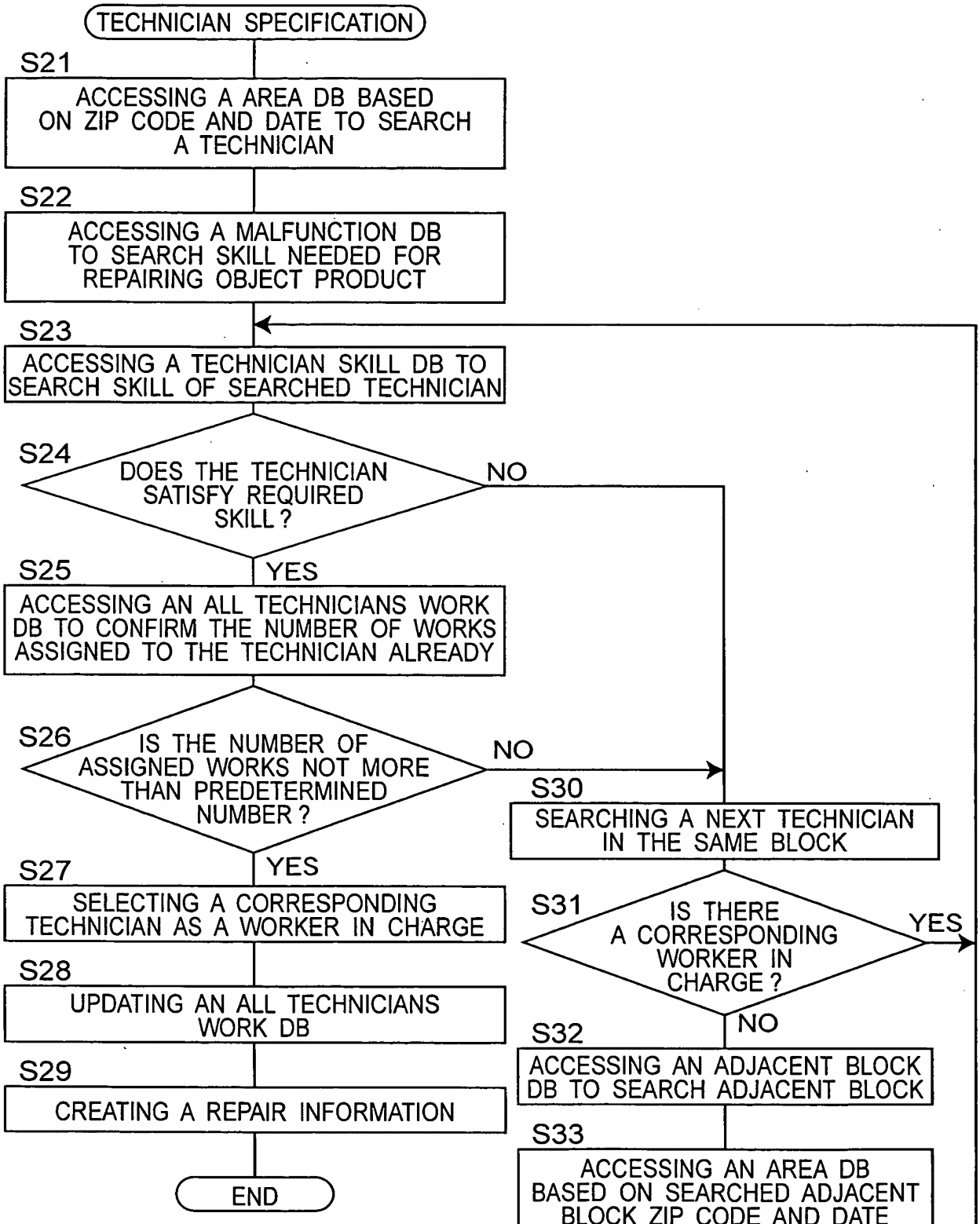

TECHNICIAN SPECIFICATION
S21
ACCESSING A AREA DB BASED ON ZIP CODE AND DATE TO SEARCH A TECHNICIAN
S22
ACCESSING A MALFUNCTION DB TO SEARCH SKILL NEEDED FOR REPAIRING OBJECT PRODUCT
S23
ACCESSING A TECHNICIAN SKILL DB TO SEARCH SKILL OF SEARCHED TECHNICIAN
S24
DOES THE TECHNICIAN SATISFY REQUIRED SKILL ?
NO
YES
S25
ACCESSING AN ALL TECHNICIANS WORK DB TO CONFIRM THE NUMBER OF WORKS ASSIGNED TO THE TECHNICIAN ALREADY
S26
IS THE NUMBER OF ASSIGNED WORKS NOT MORE THAN PREDETERMINED NUMBER ?
NO
YES
S27
SELECTING A CORRESPONDING TECHNICIAN AS A WORKER IN CHARGE
S28
UPDATING AN ALL TECHNICIANS WORK DB
S29
CREATING A REPAIR INFORMATION
END
S30
SEARCHING A NEXT TECHNICIAN IN THE SAME BLOCK
S31
IS THERE A CORRESPONDING WORKER IN CHARGE ?
YES
NO
S32
ACCESSING AN ADJACENT BLOCK DB TO SEARCH ADJACENT BLOCK
S33
ACCESSING AN AREA DB BASED ON SEARCHED ADJACENT BLOCK ZIP CODE AND DATE TO SEARCH A TECHNICIAN

Fig.12

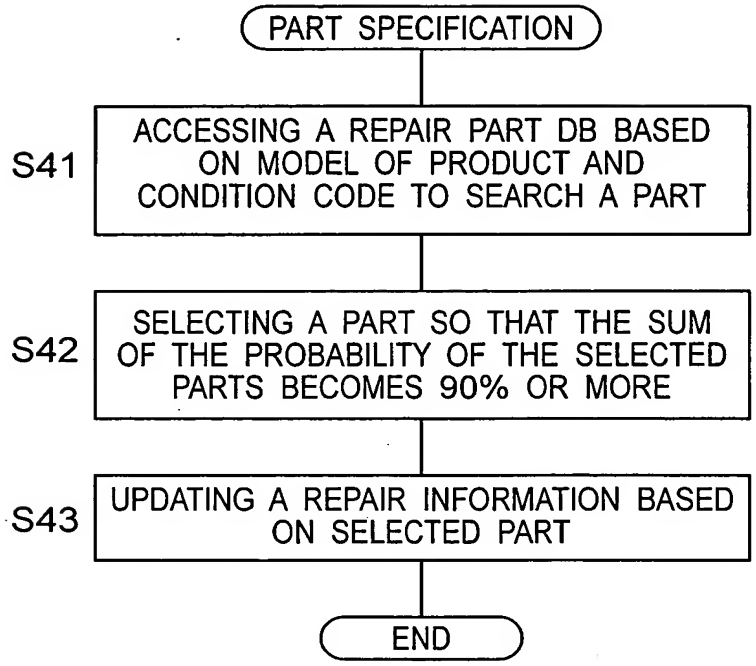

PART SPECIFICATION
S41
ACCESSING A REPAIR PART DB BASED ON MODEL OF PRODUCT AND CONDITION CODE TO SEARCH A PART
S42
SELECTING A PART SO THAT THE SUM OF THE PROBABILITY OF THE SELECTED PARTS BECOMES 90% OR MORE
S43
UPDATING A REPAIR INFORMATION BASED ON SELECTED PART
END

Fig.13

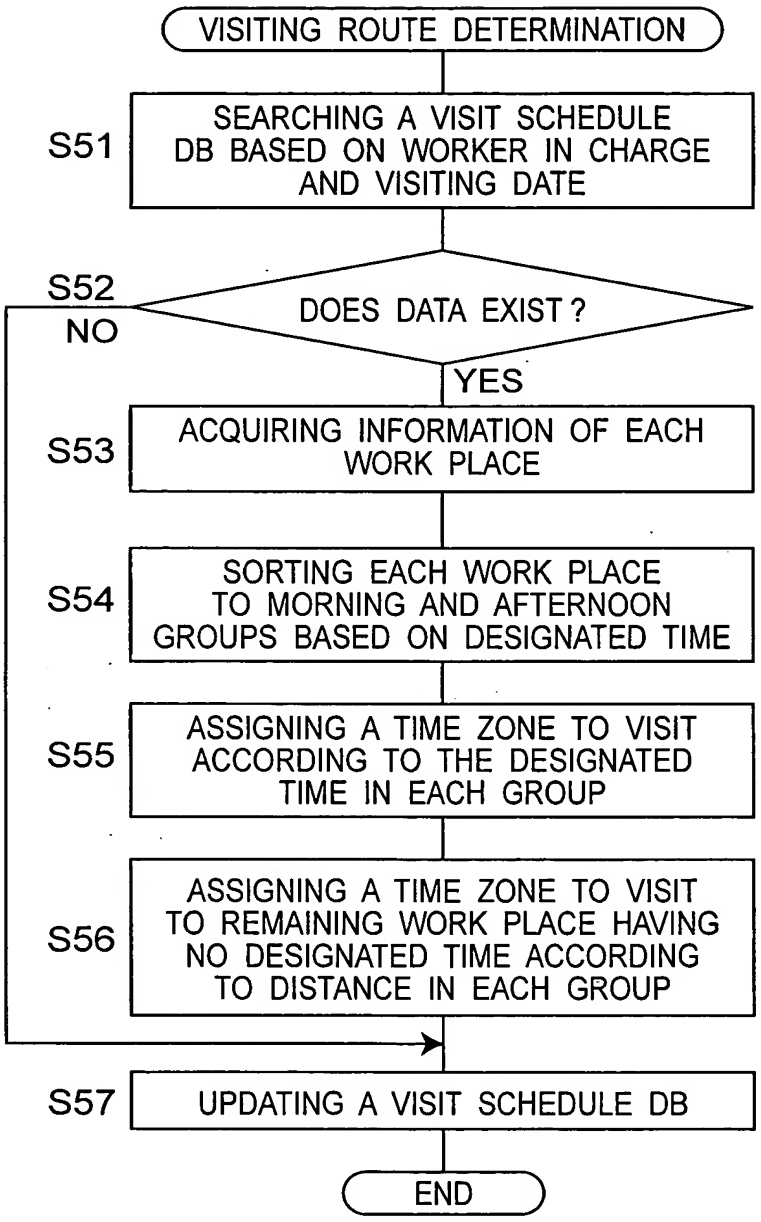

VISITING ROUTE DETERMINATION
S51
SEARCHING A VISIT SCHEDULE DB BASED ON WORKER IN CHARGE AND VISITING DATE
S52
DOES DATA EXIST ?
NO
YES
S53
ACQUIRING INFORMATION OF EACH WORK PLACE
S54
SORTING EACH WORK PLACE TO MORNING AND AFTERNOON GROUPS BASED ON DESIGNATED TIME
S55
ASSIGNING A TIME ZONE TO VISIT ACCORDING TO THE DESIGNATED TIME IN EACH GROUP
S56
ASSIGNING A TIME ZONE TO VISIT TO REMAINING WORK PLACE HAVING NO DESIGNATED TIME ACCORDING TO DISTANCE IN EACH GROUP
S57
UPDATING A VISIT SCHEDULE DB
END

Fig.14

MAP INFORMATION

WORK PLACE NAME (TEXT)	WORK PLACE ADDRESS (TEXT)	WORK PLACE ADDRESS (LATITUDE AND LONGITUDE)
KAZUO TANAKA	KITA-KU OSAKA CITY···	(X_1, Y_1)
JIRO YAMADA	CHUO-KU OSAKA CITY···	(X_2, Y_2)
⋮	⋮	⋮
TARO SUZUKI	OOAZA-KADOMA KADOMA CITY···	(X_j, Y_j)

VISIT ORDER

Fig.15

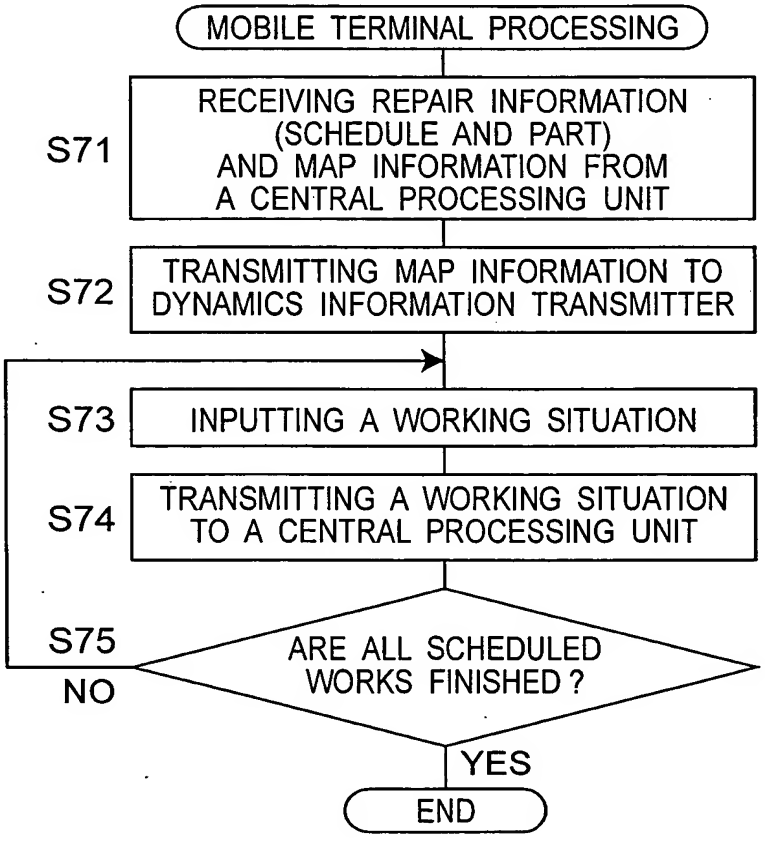


Fig.16

TECHNICIAN SUPPORT SYSTEM

TECHNICIAN SCHEDULE REFERENCE

DATE : 03/10/30
CODE : 5001

	CLIENT	ADDRESS	TEL	MODEL	SCHEDULE	RECORD	SITUATION
1	TANAKA	CHUO-KU OSAKA CITY	06-6900-0001	NA-FD8000		00 : 00	E
2	HASHIMOTO	OOKUBO MORIGUCHI CITY	06-6905-0002	CM-K18FHF	09 : 00	00 : 00	EC
3	KOBAYASHI	ASAHI-KU OSAKA CITY	06-6920-0003	NR-DL37V1	09 : 30	00 : 00	E
	.	.	.	.	10 : 00		
	.	.	.	.			
	.	.	.	.			
10	FUJITA	TUKIDE-CHO KADOMA CITY	06-6907-0004	NP-P60X1P1	16 : 00	00 : 00	E

DETAIL	PROGRESS SITUATION	SITUATION INPUT	RETURN
F1	F5	F9	12

Fig.17

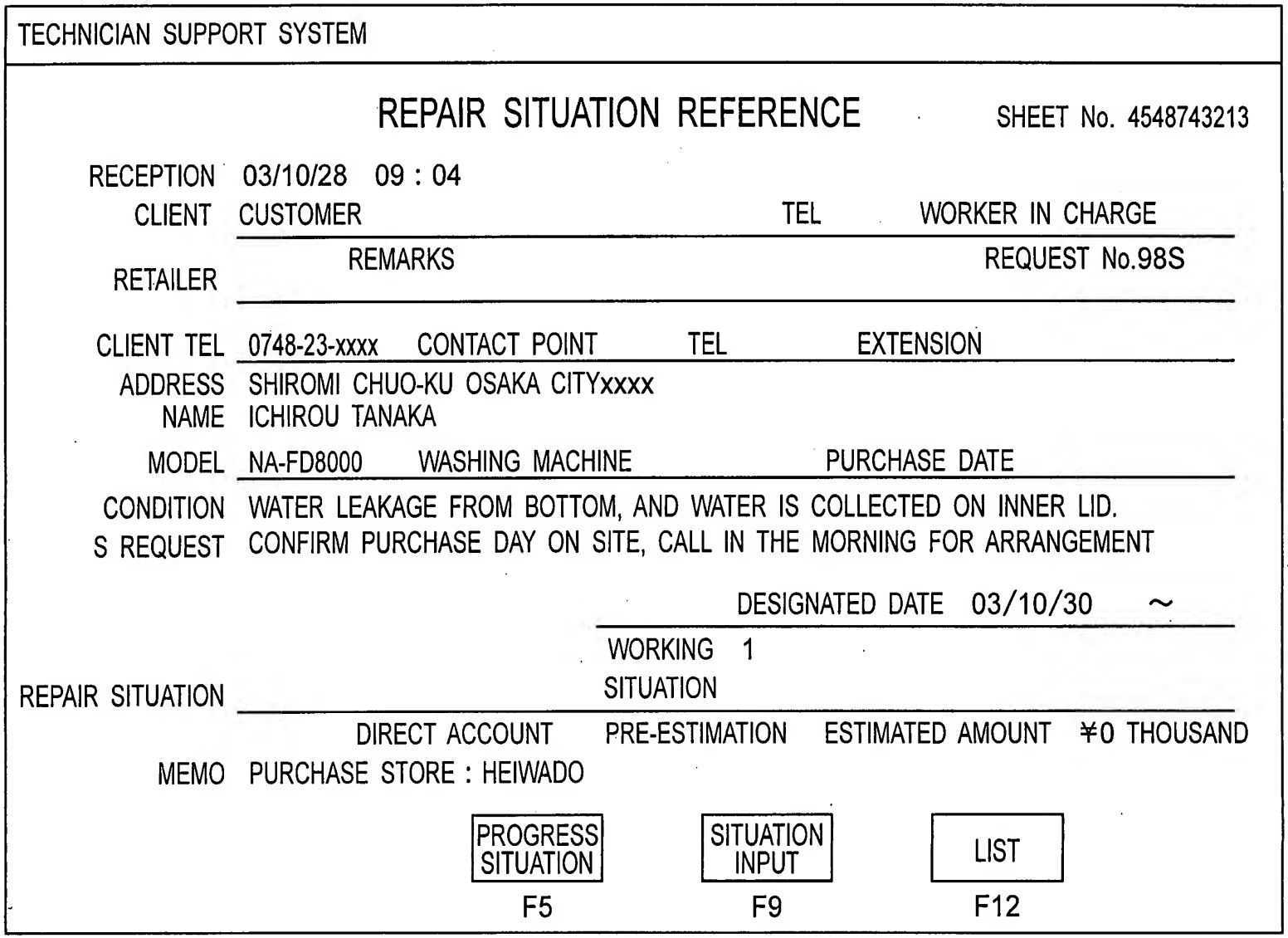

TECHNICIAN SUPPORT SYSTEM
REPAIR SITUATION REFERENCE
SHEET No. 4548743213
RECEPTION 03/10/28 09 : 04
CLIENT CUSTOMER
TEL
WORKER IN CHARGE
RETAILER
REMARKS
REQUEST No.98S
CLIENT TEL 0748-23-xxxx CONTACT POINT
TEL
EXTENSION
ADDRESS SHIROMI CHUO-KU OSAKA CITYxxxx
NAME ICHIROU TANAKA
MODEL NA-FD8000 WASHING MACHINE
PURCHASE DATE
CONDITION WATER LEAKAGE FROM BOTTOM, AND WATER IS COLLECTED ON INNER LID.
S REQUEST CONFIRM PURCHASE DAY ON SITE, CALL IN THE MORNING FOR ARRANGEMENT
DESIGNATED DATE 03/10/30 ~
WORKING 1
REPAIR SITUATION
SITUATION
DIRECT ACCOUNT
PRE-ESTIMATION
ESTIMATED AMOUNT ¥0 THOUSAND
MEMO PURCHASE STORE : HEIWADO
PROGRESS SITUATION
F5
SITUATION INPUT
F9
LIST
F12

Fig.18

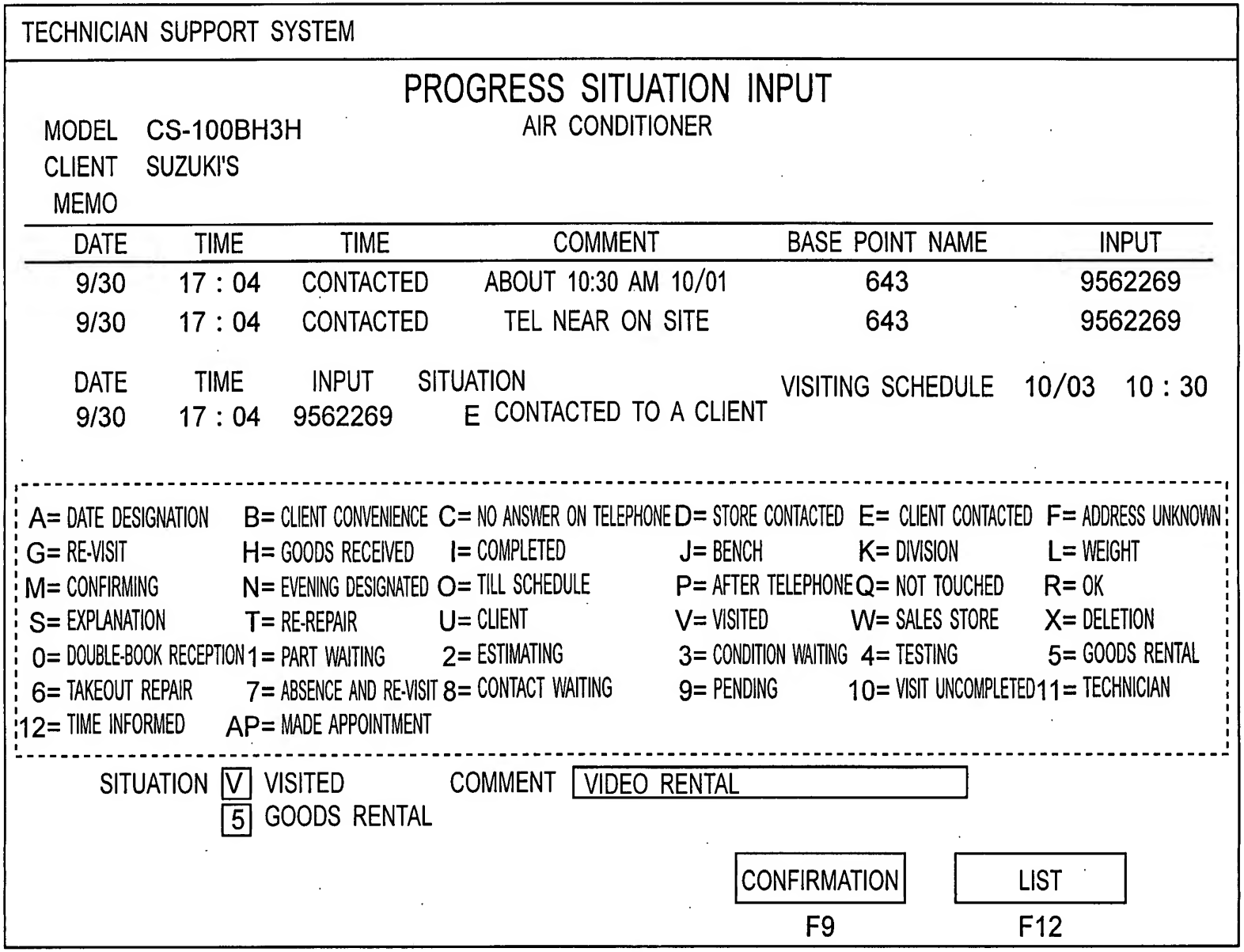

TECHNICIAN SUPPORT SYSTEM
PROGRESS SITUATION INPUT
MODEL CS-100BH3H
AIR CONDITIONER
CLIENT SUZUKI'S
MEMO
DATE TIME TIME COMMENT BASE POINT NAME INPUT
9/30 17 : 04 CONTACTED ABOUT 10:30 AM 10/01 643 9562269
9/30 17 : 04 CONTACTED TEL NEAR ON SITE 643 9562269
DATE TIME INPUT SITUATION VISITING SCHEDULE 10/03 10 : 30
9/30 17 : 04 9562269 E CONTACTED TO A CLIENT
A= DATE DESIGNATION B= CLIENT CONVENIENCE C= NO ANSWER ON TELEPHONE D= STORE CONTACTED E= CLIENT CONTACTED F= ADDRESS UNKNOWN
G= RE-VISIT H= GOODS RECEIVED I= COMPLETED J= BENCH K= DIVISION L= WEIGHT
M= CONFIRMING N= EVENING DESIGNATED O= TILL SCHEDULE P= AFTER TELEPHONE Q= NOT TOUCHED R= OK
S= EXPLANATION T= RE-REPAIR U= CLIENT V= VISITED W= SALES STORE X= DELETION
0= DOUBLE-BOOK RECEPTION 1= PART WAITING 2= ESTIMATING 3= CONDITION WAITING 4= TESTING 5= GOODS RENTAL
6= TAKEOUT REPAIR 7= ABSENCE AND RE-VISIT 8= CONTACT WAITING 9= PENDING 10= VISIT UNCOMPLETED 11= TECHNICIAN
12= TIME INFORMED AP= MADE APPOINTMENT
SITUATION V VISITED
5 GOODS RENTAL
COMMENT VIDEO RENTAL
CONFIRMATION
F9
LIST
F12

Fig.19

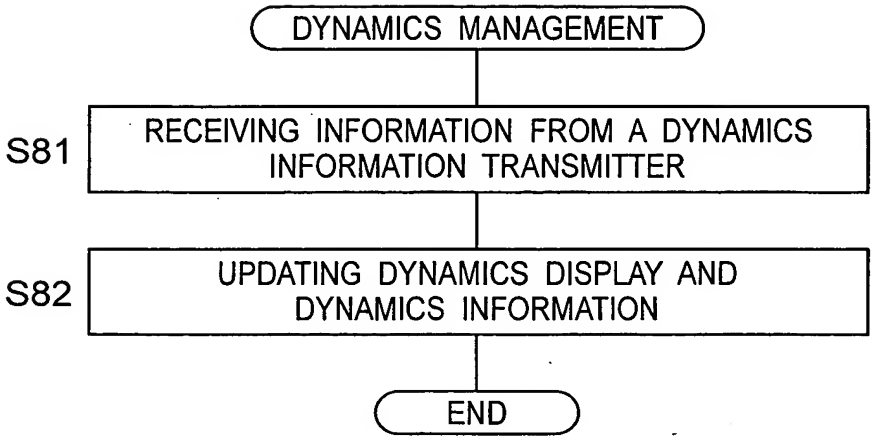

DYNAMICS MANAGEMENT
S81
RECEIVING INFORMATION FROM A DYNAMICS INFORMATION TRANSMITTER
S82
UPDATING DYNAMICS DISPLAY AND DYNAMICS INFORMATION
END

Fig.20

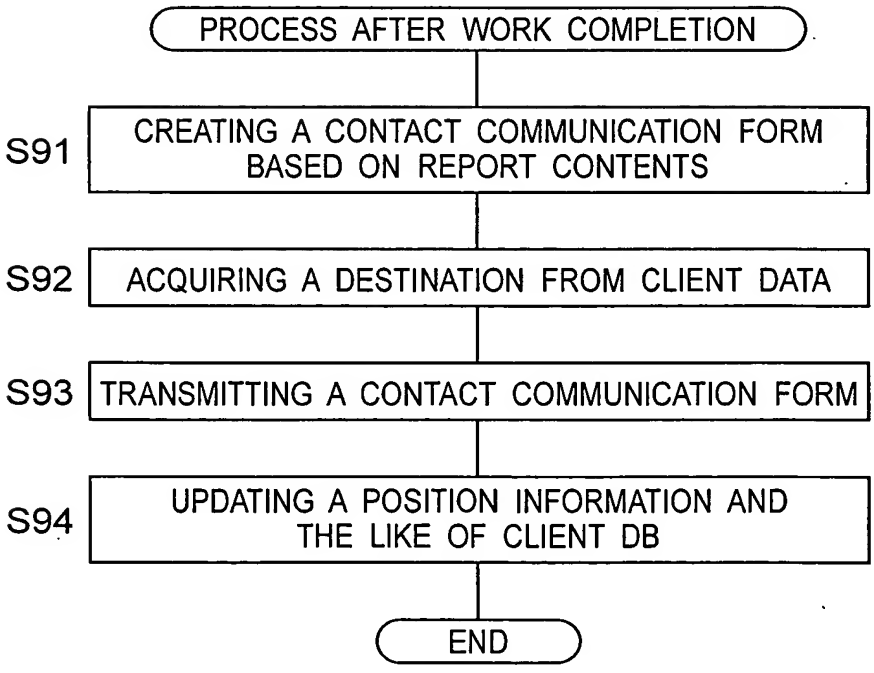

PROCESS AFTER WORK COMPLETION
S91
CREATING A CONTACT COMMUNICATION FORM BASED ON REPORT CONTENTS
S92
ACQUIRING A DESTINATION FROM CLIENT DATA
S93
TRANSMITTING A CONTACT COMMUNICATION FORM
S94
UPDATING A POSITION INFORMATION AND THE LIKE OF CLIENT DB
END

Fig.21

SITUATION OF THE REPAIR REQUEST IS AS FOLLOWS.

NOTES

CLIENT NAME : MR. HISAO YAMADA
TEL : 06-6685-XXXX
ADDRESS : NAGAYOSI-IDO HIRANO-KU OSAKA CITY
MODEL : DL-GX3

VISIT DAY : OCTOBER 3
SITUATION : COMPLETED

INQUIRY No. 454-216-8714
KINKI MATSUSHITA TECHNICAL SERVICE CO., LTD.

WORKER IN CHARGE TADASHI MIYAYAMA

Fig.22

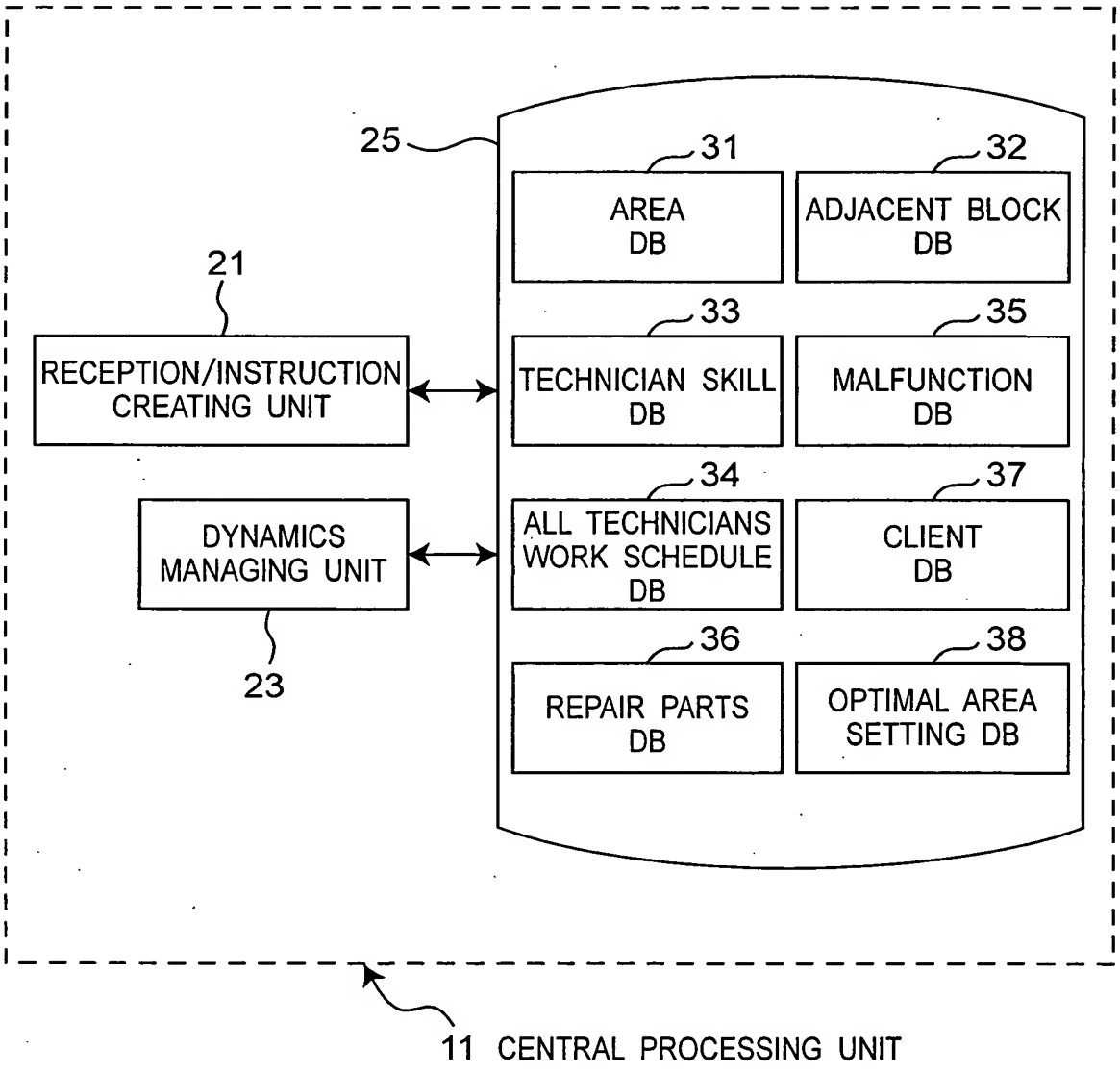

25
31
AREA DB
32
ADJACENT BLOCK DB
21
RECEPTION/INSTRUCTION CREATING UNIT
33
TECHNICIAN SKILL DB
35
MALFUNCTION DB
34
ALL TECHNICIANS WORK SCHEDULE DB
37
CLIENT DB
DYNAMICS MANAGING UNIT
23
36
REPAIR PARTS DB
38
OPTIMAL AREA SETTING DB
11 CENTRAL PROCESSING UNIT

Fig.23

OPTIMAL AREA SETTING DATABASE

ZIP CODE	BLOCK	MONTH	WORK RECORD	ADJACENT BLOCK		
				BLOCK 1	BLOCK 2	BLOCK 3
123-4567	A 1	JANUARY	70	A 2	X	X
		FEBRUARY	80	A 2	X	X
		•	•	•	•	•
		•	•	•	•	•
		JULY	1	A 2	B 1	X
		AUGUST	5	A 2	B 1	X
		•	•	•	•	•
		•	•	•	•	•
		DECEMBER	50	A 2	X	X
123-4667	A2	JANUARY	80	A 1	A 3	X
		FEBRUARY	85	A 1	A 3	X
		•	•	•	•	•
		•	•	•	•	•
		JULY	5	A 1	A 3	B 2
		AUGUST	5	A 1	A 3	B 2
		•	•	•	•	•
		•	•	•	•	•
		DECEMBER	60	A 1	A 3	
123-4767	A3	JANUARY	50	A 2	A 4	B 3
		FEBRUARY	45	A 2	A 4	B 3
		•	•	•	•	•
		•	•	•	•	•
		JULY	80	A 2	A 4	B 3
		AUGUST	80	A 2	A 4	B 3
		•	•	•	•	•
		•	•	•	•	•
		DECEMBER	50	A 2	A 4	B 3
		•	•	•	•	•

Fig.24

MONTHLY WORK RECORD

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
A 1	70	80	30	10	5	5	1	5	5	5	30	50
A 2	80	85	30	5	10	10	5	5	10	10	40	60
•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•
E 4	30	25	20	5	5	5	10	80	60	15	10	20
E 5	20	20	15	1	1	5	10	70	40	10	5	15

Fig.25

ZIP CODE 123-4567 BLOCK A1	ZIP CODE 123-4568 BLOCK B1	ZIP CODE 123-4569 BLOCK C1	ZIP CODE 123-4570 BLOCK D1	ZIP CODE 123-4571 BLOCK E1
ZIP CODE 123-4667 BLOCK A2	ZIP CODE 123-4668 BLOCK B2	ZIP CODE 123-4669 BLOCK C2	ZIP CODE 123-4670 BLOCK D2	ZIP CODE 123-4671 BLOCK E2
ZIP CODE 123-4767 BLOCK A3	ZIP CODE 123-4768 BLOCK B3	ZIP CODE 123-4769 BLOCK C3	ZIP CODE 123-4770 BLOCK D3	ZIP CODE 123-4771 BLOCK E3
ZIP CODE 123-4867 BLOCK A4	ZIP CODE 123-4868 BLOCK B4	ZIP CODE 123-4869 BLOCK C4	ZIP CODE 123-4870 BLOCK D4	ZIP CODE 123-4871 BLOCK E4
ZIP CODE 123-4967 BLOCK A5	ZIP CODE 123-4968 BLOCK B5	ZIP CODE 123-4969 BLOCK C5	ZIP CODE 123-4970 BLOCK D5	ZIP CODE 123-4971 BLOCK E5

Fig.26A

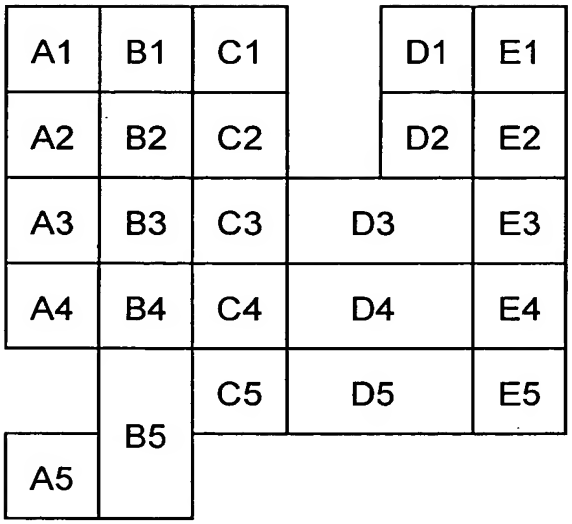


Fig.26B

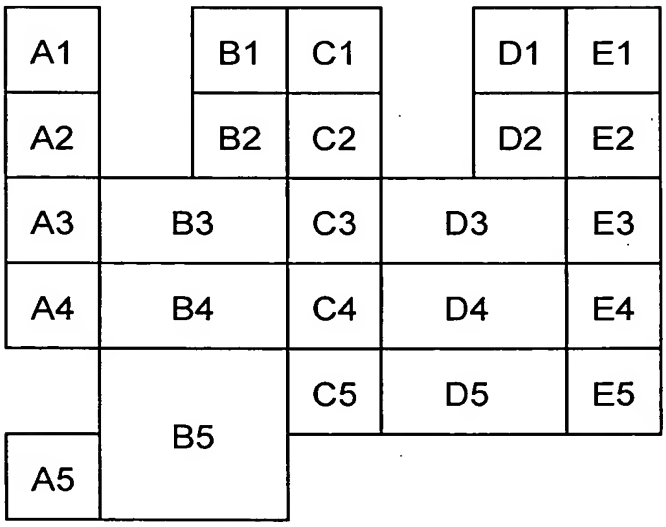


Fig.27

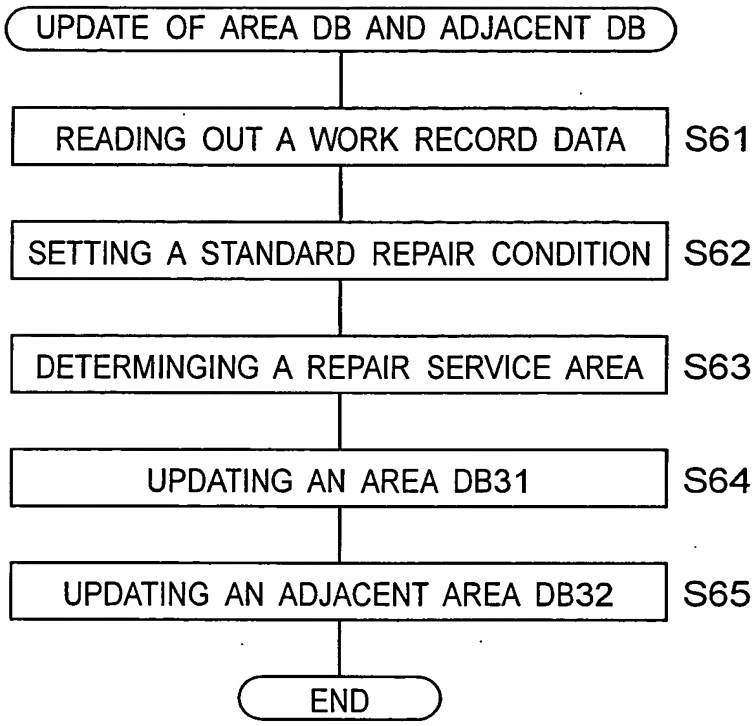

UPDATE OF AREA DB AND ADJACENT DB
READING OUT A WORK RECORD DATA
S61
SETTING A STANDARD REPAIR CONDITION
S62
DETERMINGING A REPAIR SERVICE AREA
S63
UPDATING AN AREA DB31
S64
UPDATING AN ADJACENT AREA DB32
S65
END

Fig.28

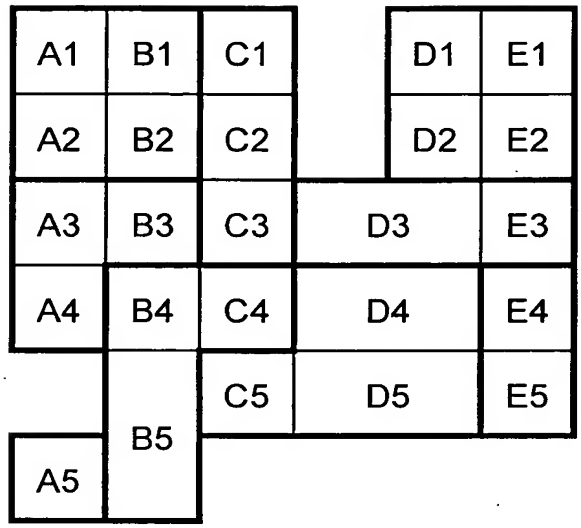

A1
B1
C1
D1
E1
A2
B2
C2
D2
E2
A3
B3
C3
D3
E3
A4
B4
C4
D4
E4
C5
D5
E5
B5
A5

Fig.29

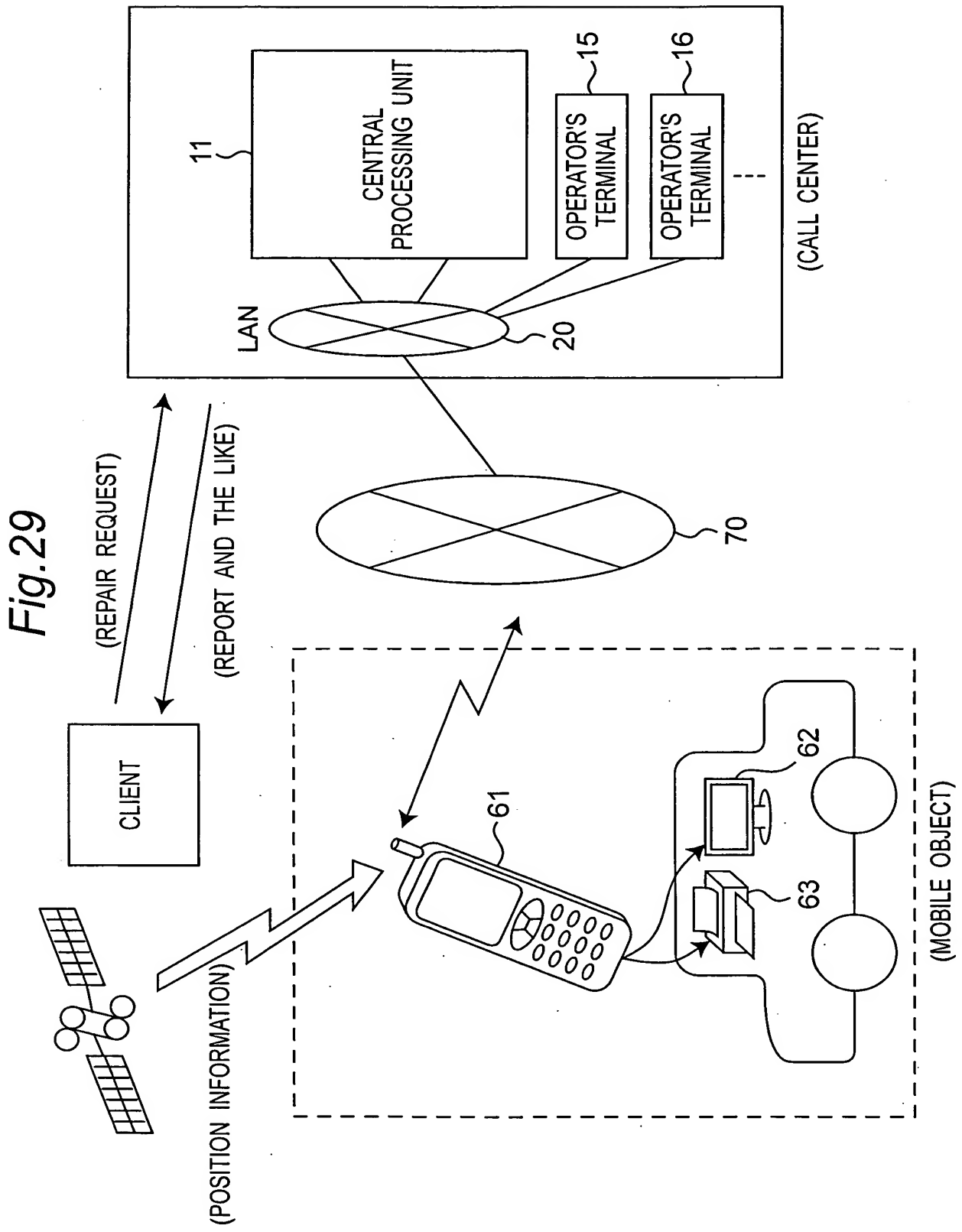
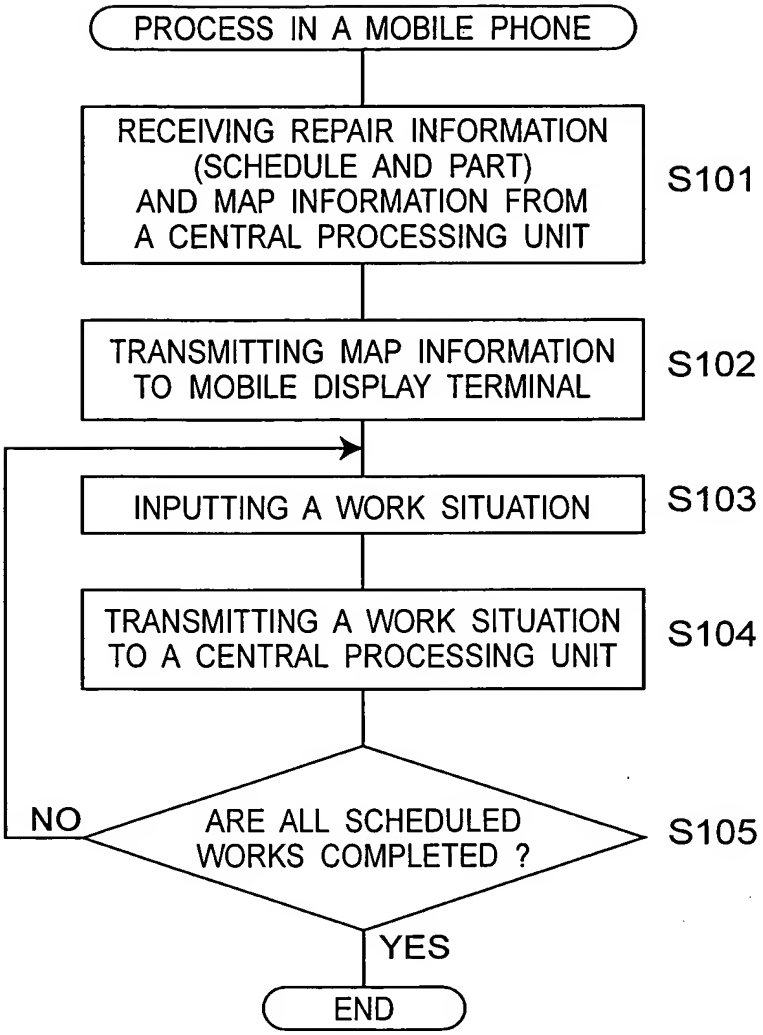

(CALL CENTER)
11
CENTRAL PROCESSING UNIT
15
OPERATOR'S TERMINAL
16
OPERATOR'S TERMINAL
LAN
20
70
(REPAIR REQUEST)
(REPORT AND THE LIKE)
CLIENT
61
62
63
(MOBILE OBJECT)
(POSITION INFORMATION)

Fig.30


PROCESS IN A MOBILE PHONE
RECEIVING REPAIR INFORMATION (SCHEDULE AND PART) AND MAP INFORMATION FROM A CENTRAL PROCESSING UNIT
S101
TRANSMITTING MAP INFORMATION TO MOBILE DISPLAY TERMINAL
S102
INPUTTING A WORK SITUATION
S103
TRANSMITTING A WORK SITUATION TO A CENTRAL PROCESSING UNIT
S104
ARE ALL SCHEDULED WORKS COMPLETED ?
S105
NO
YES
END